1882MNRAS..42..367D

8. Difference in the relative positions in the field of the two images in different observations.

Harvard College Observatory:
1882, *May* 8.

On Photographs of the Nebula in Orion, and of its Spectrum.
By Henry Draper, Esq., M.D.

(*Communicated by A. C. Ranyard, Esq.*)

At the meeting of the Royal Astronomical Society in January 1881 I presented a photograph of the nebula in *Orion*, which was taken on September 30, 1880, with my Clark telescope of 11 inches aperture and an exposure of 51 minutes. This was the first photograph ever taken of a nebula. It comprised the brightest parts in the neighbourhood of the trapezium, and showed the condensed masses well. In March 1881 a number of photographs of the nebula were taken, the best being on March 11 with an exposure of 104 minutes. By comparison with the former picture this made a marked advance, and minute stars down to the 14·7 magnitude of Pogson's scale were shown. An account of it was read before the French Academy of Sciences, and printed in the "Comptes Rendus," April 18, 1881.

On March 14, 1882, the negative was made from which the enlarged photolithographs herewith presented were produced. The instrument used was the Clark photographic refractor of 11 inches aperture, mounted on the equatoreal stand, and driven by the clock I had constructed. The exposure was from 7^{h} 8^{m} to 9^{h} 25^{m}—that is, 137 minutes. Gelatino-bromide plates were employed. The night was clear, but cold and windy. The mean temperature was 27° F.; the wind NNW. and in gusts, the strongest pressure being 5 pounds per square foot, about 9 o'clock; the whole travel of the wind during the exposure was 35 miles. The variation in the force of the wind is one reason why the stars show some ellipticity under this magnifying power. The gusts of course displaced the telescope somewhat, though the mounting is firm and the clockwork strong.

In the photograph the larger stars are much over-exposed, the proper time to make a good picture of the trapezium being about 2 minutes. The twinkling of these stars is therefore recorded on the sensitive plate, and gives to them an excess of size. If a photograph should be taken on a steady night, the stars of the trapezium would be easily separated, and in the original negative of this picture, in a strong light, the separation can be seen. The variation in size of the stellar images gives an idea of the relative magnitude of the stars, though that estimate requires correction for the colour of the stars. It must be remembered that no one enlargement can do justice to the original negative: various exposures, various intensities of light,

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1882MNRAS..42..368N

and various points of view are necessary for a complete examination.

On comparing this photograph with the well-known drawings of the same object by Lord Rosse, Bond, Struve, Lassell, Trouvelot, Secchi, and others, it will be noticed that most of the small stars, about which there is no dispute, are represented, and the outlying streamers are well indicated. It is worthy of remark also that in this photograph with an exposure of only 137 minutes I have depicted stars almost the *minimum visible* in this telescope, and it is not unreasonable to hope that by still further prolonging the exposure and by still further study of photographic processes, stars and details entirely invisible to the eye may be secured. With this object in view, I have under consideration a new form of mounting which will permit of continuous exposures of six hours.

During the month of March 1882 I also made four photographs of the spectrum of the nebula in *Orion*, which are described in the May number of the "American Journal of Science." Two of these were obtained with the slit spectroscope I usually employ for photographing spectra of the stars, and they show two lines in the ultra-violet plainly, besides the traces of two others. The first-mentioned two are hydrogen γ λ 4340 and hydrogen δ λ 4101; the others are too faint to give a good estimate of the wave-length.

The other spectrum photographs, taken without a slit, show that two of the condensed masses preceding the trapezium give a continuous spectrum, and therefore contain either gas under pressure, or liquid or solid matter.

271 *Madison Avenue, New York:*
1882, *May.*

Some Remarks on Mr. Newcomb's Paper "On the Instructions for Observing the Transit of Venus formulated by the Paris International Conference." By E. J. Stone, Esq., M.A., F.R.S.

It is greatly to be regretted that the step which was taken by the English Committee in the October of 1881 of issuing a draft of Instructions to Observers for consideration and discussion did not lead to any direct interchange of ideas between the American and European astronomers. I believe that an interchange of ideas, such as that contemplated, would have led to the adoption of "Instructions" which were identical in all essential points, and I hope that this object may yet be secured. The remarks made in the *Notices* for April by Mr. Newcomb, on the Instructions issued by the International Committee on the Transit of *Venus*, are interesting, and require consideration; but unfortunately they are stated to be simply "an individual contribution to the discussion," and the time for discussion is

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